CENTRAL VALLEY REGIONAL
WATER QUALITY CONTROL BOARD

Concentrations of Pesticides in Sacramento Metropolitan Area Rainwater during the 2004 Orchard Dormant Spray Season

May 2005

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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REGIONAL WATER QUALITY CONTROL BOARD
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Executive Summary

Previous studies have shown that chlorpyrifos and diazinon are present in the Sacramento-area atmosphere throughout the year, and seasonal patterns of chlorpyrifos and diazinon levels in the atmosphere indicate that during the months of January and February, orchard dormant spraying is the dominant source. Aerial deposition of pesticides, rain and fog containing dissolved chemicals to ground surfaces, is a possible source of contamination of creeks from storm water runoff.

Twenty-two rainwater samples were collected during a total of seven storm events beginning January 29, 2004 and ending April 18, 2004. Environmental samples and quality assurance and quality control samples from four sites were analyzed for diazinon, chlorpyrifos and other pesticides. The sites were located in Lincoln, in Stockton, at Sump 104 in Sacramento, and at Prairie City State Vehicular Recreation Area in Rancho Cordova. An attempt was made to deploy the rain sample collectors as close as possible to the beginning of anticipated storm events, generally a day before the forecasted rain. Rainwater collecting devices consisted of a funnel or bowl to collect rainwater that drained into a glass carboy. The devices were deployed shortly before each storm event by Regional Board and Deltakeeper staff and by the Sacramento Stormwater Program Permittee staff.

Diazinon and chlorpyrifos were detected in rainwater samples from both the Lincoln and Stockton sites and diazinon was detected in rainwater at the Sump 104 site. Simazine, carbaryl, metolachlor, dacthal (DCPA), methidathion, azinphos methyl, and pendimethalin were also detected in rainwater samples. The Stockton site had the highest levels of diazinon and chlorpyrifos at 0.96 and 0.043 µg/L respectively. In general, the Stockton site had higher levels of chlorpyrifos and diazinon in the samples than any of the other sites for each storm event sampled.

Glossary

APPL – Agricultural and Priority Pesticides Laboratory

CDFA – California Department of Food and Agriculture

CDFG – California Department of Fish and Game

CVRWQCB – Central Valley Regional Water Quality Control Board

PQL – Practical Quantitation Limit

QA/QC – Quality assurance and quality control

Regional Board – Central Valley Regional Water Quality Control Board

RPD – Relative Percent Difference

USEPA – United States Environmental Protection Agency

USGS – United States Geological Survey

Foreward

Sample analysis for the Regional Board's portion of this monitoring project was conducted by the California Department of Food and Agriculture (CDFA) laboratory in Sacramento, California. Sample analysis for the Sacramento Stormwater Program Permittees was conducted by Agricultural and Priority Pesticides Laboratory (APPL) in Fresno, California and by Caltest in Napa, California. The Regional Board sampling plan was developed and sample collection was performed by Central Valley Regional Water Quality Control Board staff with assistance from DeltaKeeper staff on rain sample collection in Stockton, California. Data for the Sacramento County sites was collected and reported by Sacramento Stormwater Program Permittee staff.

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1 Background

Previous studies have shown that chlorpyrifos and diazinon are present in the Sacramento-area atmosphere throughout the year, and seasonal patterns of chlorpyrifos and diazinon levels in the atmosphere coincide with the orchard dormant spraying season during the months of January and February, (Majewski and Baston, 2002, Spector *et al.*, 2004). Majewski and Baston (2002) suggest that agriculture is the predominant source of diazinon in the atmosphere during the winter dormant spray season and that urban usage is the predominant source during the summer in the Central Valley. Rain and fog are considered potentially important pesticide transport mechanisms in the atmosphere, particularly since the winter rainy season in the Central Valley coincides with the orchard dormant spray season in the valley (Majewski and Baston, 2002**;** Bailey *et al.*, 2000). Thus, atmospheric deposition of pesticides to ground surfaces, in the Sacramento metropolitan area may originate from nearby urban usage or from agricultural applications occurring many miles away. During rainfall events, some portion of the pesticides in rainfall can subsequently runoff into Sacramento area waterways.

A 1996 - 1997 United States Geological Survey (USGS) study of atmospheric transport of pesticides in the Sacramento County metropolitan area collected composite bulk air samples weekly, along with wind speed and wind direction measurements, at one urban and two agricultural locations in Sacramento County. A variety of pesticides were detected throughout the study period. Diazinon and chlorpyrifos, and three other pesticides were detected most frequently and at the highest concentrations. Chlorpyrifos and diazinon were frequently detected at all monitoring sites, particularly when the prevailing wind was from the south (Majewski and Baston, 2002).

Aerial deposition of pesticides from rain and fog to ground surfaces and subsequent stormwater runoff are possible sources of contamination of creeks. Other possible sources of pesticides in stormwater runoff are direct washing from plants, soil, and impervious surfaces to which they were applied. Within urban areas of these watersheds, diazinon, chlorpyrifos, and other pesticides have been found in urban creeks and the contamination is thought to originate from structural pest control, landscape maintenance, and other municipal applications, as well as from local and regional agricultural uses, particularly during the orchard dormant spray season (Majewski and Baston, 2002, Bailey *et al.,* 2000, Spector *et al.,* 2004).

A previous study conducted by the Central Valley Regional Water Quality Control Board (CVRWQCB, Regional Board) from 2001-2003 has shown that chlorpyrifos and diazinon and other pesticides are present in the rainwater samples collected from four Central Valley sites located in Lincoln, Stockton, and Sacramento (two sites), California. Rainfall and creek samples were collected during three orchard dormant spray seasons, 2001, 2002, and 2003 (Spector *et al.,* 2004).

The USEPA and technical registrants of diazinon and chlorpyrifos insecticides agreed to cancel most non-agricultural uses. The manufacture and sale of chlorpyrifos products for use by residents in the urban environment were stopped as of December 2001 and professional chlorpyrifos use in the urban environment is being scaled back**.** The sale of diazinon products for use in the urban environment (landscape maintenance and any other outdoor residential or outdoor non-agricultural areas) was discontinued as of December 31, 2004. However, individual homeowners that have purchased chlorpyrifos or diazinon products prior to the stop-sale dates can continue to use their supplies and, therefore, might continue to be a potential source for chlorpyrifos and diazinon in runoff within Sacramento County and consequently in urban creeks uses (USEPA, 2000 and USEPA, 2001a).

In the agricultural environment, many chlorpyrifos and diazinon uses are being further restricted (USEPA, 2001b and USEPA, 2002). The USEPA, however, is not phasing out or restricting chlorpyrifos use at nurseries but is restricting the diazinon use at nurseries, from a use rate of 2 pounds per acre to 1 pound per acre (Meyers, 2002 and Parsons, 2002). Due to the changes in USEPA-allowed diazinon and chlorpyrifos uses, insecticides containing pyrethroids are typically replacing diazinon and chlorpyrifos insecticides historically used in both urban and agricultural environments.

2 Introduction

The purpose of the Regional Board's rain monitoring study is to measure and document trends of diazinon and chlorpyrifos concentrations in Sacramento Valley rainfall during and following the Central Valley orchard dormant spray season. Storm events were sampled during the orchard dormant spray season months of January through April 2004 to determine pesticide concentrations in rain during and after the orchard dormant spray season.

Monitoring of the two Sacramento County sites was conducted by Sacramento Stormwater Program Permittee staff while monitoring was conducted by Regional Board staff in Lincoln and Deltakeeper in Stockton.

3 Objective

This study focused on monitoring and assessing diazinon, chlorpyrifos and other pesticide concentrations in rainfall during and following the Central Valley orchard dormant spray season.

4 Study Area

The study area spanned the greater Sacramento area, from Lincoln in the north to Stockton in the south (Figure 1). The study area included rainfall sampling locations described below.

Placer County:

Lincoln Airport (R3) – This site is used mainly for airport traffic; some commercial buildings, residential areas, and industrial lands are nearby.

San Joaquin County:

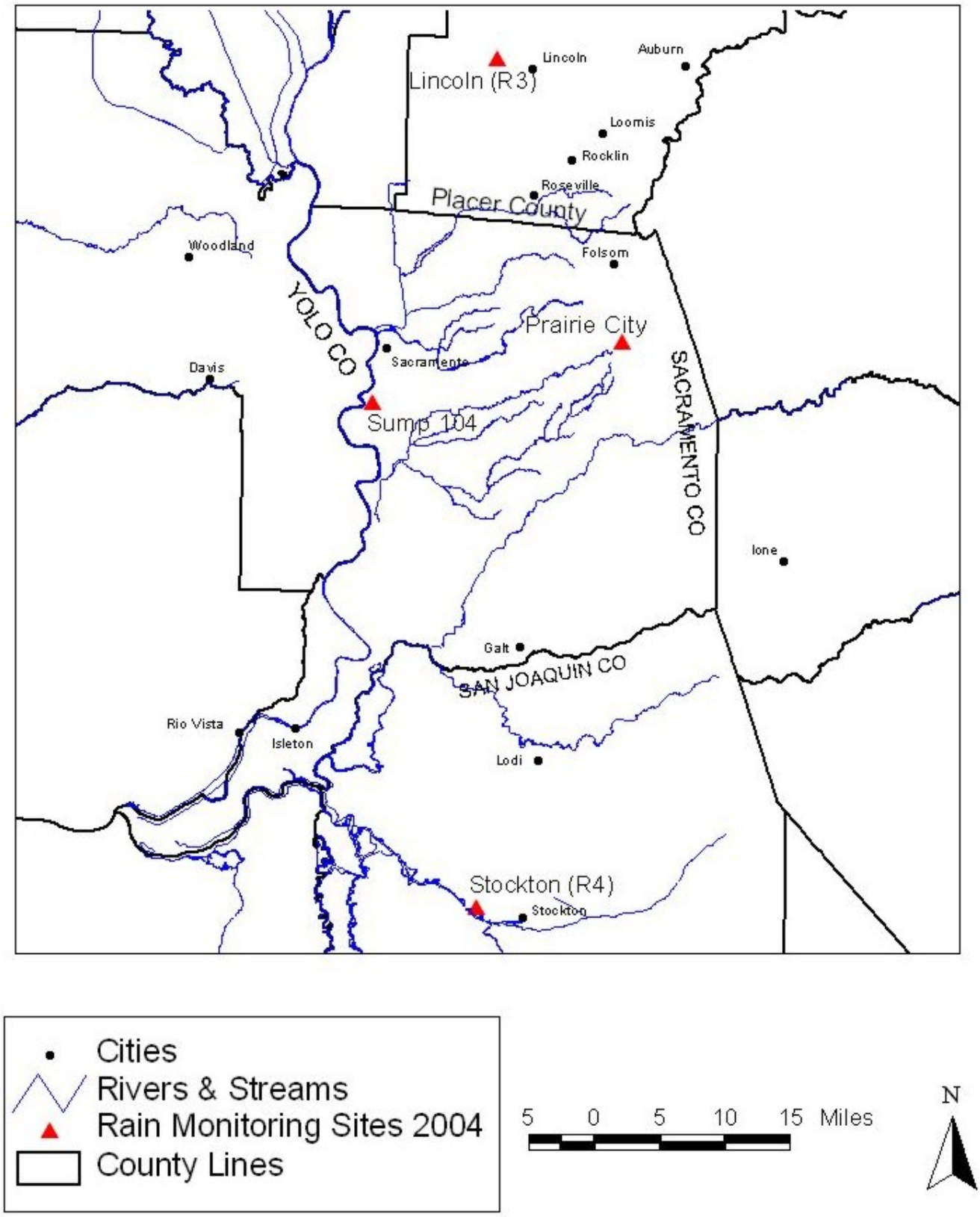
Stockton (R4) – This site is located at 3536 Rainier Ave. in Stockton, and has nearby residential use and a golf course.

Sacramento County:

Prairie City – This site is located in a rural area near the ranger station within the Prairie City State Vehicular Recreation Areas near Rancho Cordova. The rain-collecting station is located in the southwest corner of the park.

Sump 104 – This site is the City of Sacramento's stormwater pump used during storm events. The area in which this rain-collecting site, located within the city of Sacramento, has urban land uses.

Figure 1. Rain Sampling Sites for the 2004 Orchard Dormant Spray Season.



5 Rain Sample Collection and Laboratory Analytical Methods

Rainfall sample collection methods, laboratory analytical methods, and quality assurance/quality control samples are discussed below.

5.1 Rain Sample Collection Method

Two similar techniques were used by Regional Board staff and the Sacramento Stormwater Program Permittee staff to collect rainwater. Regional Board staff collected rainwater samples at the Lincoln and Stockton sites and the Sacramento Permittees collected rainwater samples at the two Sacramento County sites, Sump 104 and Prairie City.

The rain sampling technique used by Regional Board/Deltakeeper staff at the Lincoln and Stockton sites for this monitoring program was based on Regional Board sampling techniques employed from 2001-2003 (Spector *et al.,* 2004). Rainfall samples were collected using rainfall collecting devices that consisted of a 19-inch diameter stainless steel bowl with a hole punched in the bottom that was secured with stainless steel wire to the top of a 5-gallon plastic bucket. A 3/8-inch diameter piece of stainless steel tubing set into the hole in the bowl guided water from the stainless steel bowl into a 2.8-gallon glass carboy set inside the bucket.

The Sacramento Stormwater Program Permittees collected rainfall samples at Sump 104 and Prairie City using a slightly different technique. The rainfall collecting device used consisted of a 24-inch diameter funnel held up by a metal stand that emptied into a five-gallon glass carboy. The glass carboy was placed inside a five-gallon plastic bucket.

Prior to sampling, all surfaces that could come in contact with rain samples were cleaned using Liquinox and warm tap water, then rinsed thoroughly with warm tap water. All surfaces of the Regional Board's collectors were given a final rinse with deionized water. The rain collectors were placed into clean plastic bags until they were deployed.

An attempt was made to deploy the rain-collecting devices as close as possible to the beginning of anticipated storm events, generally a day before the forecasted rain. However, for some sampling events, the targeted accumulated amount of rainfall (about 0.25 inches for the Regional Board and 0.15 inches for the Sacramento Stormwater Program Permittees) did not occur within 24 hours and the rain-collecting devices were left out until there had been sufficient rainfall. Table 1 lists accumulation rainfall measurements for storm events that occurred during this study period for the Sacramento Metropolitan/International Airport and for the Stockton Fire Station rain gage stations.

Rainfall samples collected by the Regional Board were poured into pre-cleaned 1-liter glass amber bottles that had previously been rinsed three times with a small portion of the rainwater sample. For samples collected by Regional Board staff, the chain-of-custody form was filled out, the field sheet was completed, and the sample bottles were labeled and placed into a cooler with ice to be transported to the California Department of Food and Agriculture Center for Analytical Chemistry (CDFA Lab). Rainfall samples collected by Sacramento Stormwater Program Permittee staff were poured into pre-cleaned bottles.

Rain sample collection dates for all samples, and extraction dates for the CDFA lab samples for 2004, are shown in Tables 2 and 3. All Regional Board samples were extracted within their acceptable holding times by the CDFA Lab.

5.2 Laboratory Analytical Methods

Samples collected by the Regional Board were analyzed using CDFA's Multi-Residue Method for Extraction and Analysis of Pesticides in Surface Water (CDFA, 2002). Samples were analyzed using a Gas Chromatography/Mass Spectrometer Detector with selected ion method (GC/MSD-SIM mode) (CDFA, 2003). CDFA's laboratory quality control protocols for low-level pesticide analysis were followed.

Samples collected by the Sacramento Stormwater Program Permittees were analyzed by APPL using USEPA Method 8141A and by Caltest using USEPA Method 614.

5.3 Quality Assurance/Quality Control Samples

Regional Board

Additional samples were collected for quality assurance and quality control (QA/QC) purposes. The frequency that QA/QC samples were collected was based on the total number of primary samples collected during the monitoring period. Three types of quality assurance samples were collected to confirm the integrity of analytical results reported in this monitoring study. The QA/QC samples included sample duplicates, equipment blanks, and matrix spikes. Sample duplicates provide a measure of analytical precision; equipment blanks are used to evaluate possible contamination of equipment during sample collection and transport to the lab; and matrix spikes are used to evaluate the relative percent recovery of spiked chemicals by the extraction from the sample matrix. The procedures used for collecting the QA/QC samples are based on the San Joaquin River TMDL Quality Assurance Project Plan (Azimi-Gaylon and Reyes, 2002).

The amount of QA/QC samples collected for the 2004 season was 25% of the sample total. After the rainfall collecting equipment was cleaned in the field, equipment blanks were produced by pouring de-ionized water over all contact surfaces of the rain sampler apparatus, then pouring the blank sample from the carboy into a clean 1-L amber glass bottle. When collecting rain samples, duplicates were collected by swirling the sampling carboy to mix the sample and filling two identical 1-L amber glass bottles. Matrix spike samples were collected in the same manner as rain samples and were spiked by the CDFA lab.

Sacramento Stormwater Program Permittees

Quality controls for samples collected by the Sacramento Stormwater Program Permittees consisted of using ultra-clean carboy protocols that had been cleaned using USEPA Method 1669. Carboy blanks showed no contamination prior to their deployment in the field.

6 Analytical Results for Environmental Samples

Rain sample analysis results are discussed in this section and data quality assurance results are discussed in Section 7. Table 4 lists CDFA Lab Practical Quantitation Limits (PQLs) for pesticides of concern and laboratory Limits of Detection (LODs) of samples analyzed by the CDFA lab. Tables 5 and 6 show the PQLs for pesticides of concern for APPL and Caltest Laboratories. Tables 7-10 include diazinon and

chlorpyrifos concentrations measured in Sacramento urban rainwater samples during the monitoring period, as well as concentrations of other detected pesticides.

6.1 Sacramento Metropolitan Area Rainwater Sample Results for 2004

In 2004, a total of 22 environmental samples, plus two equipment blanks, two duplicates, and two matrix spikes, were submitted to the lab for analysis of diazinon, chlorpyrifos and other pesticides. See tables 4-6 for a list of analytes grouped by analyzing laboratory. The 22 samples were collected during a total of seven storm events. Regional Board staff collected environmental samples plus duplicates, blanks, and matrix spikes for a total of six storms from 01/29/2004 through 03/26/2004. The Sacramento Permittees collected samples for five storms from 02/17/2004 through 04/18/2004. Four sample sets collected concurrently from 02/17/2004 through 03/26/2004 were collected at all four sites.

Diazinon and chlorpyrifos were detected in rainwater samples from both the Lincoln and Stockton sites and diazinon was detected in rainwater at the Sump 104 site. The Stockton site had the most frequent detection of chlorpyrifos and diazinon. Chlorpyrifos was detected in 67% of the Lincoln samples and 83% of the Stockton samples, but not in either of the Sacramento stations, Sump 104 or Prairie City. Diazinon was detected in 67% of the Lincoln samples, 83% of the Stockton samples, 40% of the Sump 104 samples and in none of the Prairie City samples. The Stockton site had the highest detection of diazinon and chlorpyrifos at 0.96 and 0.043 micrograms per liter (µg/L) respectively. In general, the Stockton site had higher levels of chlorpyrifos and diazinon in the samples than any of the other sites.

Diazinon and chlorpyrifos levels ranged from non-detectable amounts (see tables 4-6 for the quantitation limits of each lab) to 0.96 µg/L of diazinon and 0.043 µg/L of chlorpyrifos. Detection of diazinon and chlorpyrifos was below the quantitation limit for all samples collected at Sump 104 and Prairie City, but detection limits of samples collected at those two sites were higher than for samples collected at the Lincoln and Stockton sites. Median detection of diazinon of samples collected at the Lincoln Airport site was below the quantitation limit of 0.020 µg/L and the concentration of diazinon in the samples ranged from <0.007 to 0.14 µg/L. The median detection of diazinon of samples collected at the Stockton site was 0.072 µg/L and ranged from <0.007 to 0.96 µg/L. At the Lincoln site, the median detection of chlorpyrifos was below the quantitation limit and the concentration of chlorpyrifos in the samples ranged from <0.004 through 0.021 µg/L. The median detection of chlorpyrifos at the Stockton site was 0.027 µg/L and ranged from <0.004 to 0.043 µg/L.

Various other pesticides were detected in the rainfall samples. Simazine, an herbicide, was detected in all but one of the rainwater samples collected at the Stockton and Lincoln sites, but was not tested for at the Sacramento County sites. Dacthal, another herbicide, was detected in all of the Stockton samples and in one of the Lincoln samples, but was not tested for in the Sacramento County samples. Carbaryl, metolachlor, and methidathion were also detected in Lincoln and Stockton rainfall samples and azinphos methyl was detected in rainfall at the Prairie City site. Pendimethalin, an herbicide, was detected in two out of three (67%) of the samples tested at the Sump 104 site, but was not tested for at the Lincoln or Stockton sites.

Tables 7-10 present the diazinon and chlorpyrifos analytical results for rain samples collected in 2004. These tables also include analytical results for other detected pesticides.

7 Analytical Results for Data Quality Samples

Quality assurance elements for the samples collected by Regional Board staff, including the quality control sample results, are reviewed below.

7.1 Calibration

CDFA calibrations for instrument performance analysis were conducted in the following manner: five concentrations of sixteen standard compounds were prepared in a reagent grade water matrix. A linear regression was used including the origin for each pesticide. The standards mixtures were analyzed, linear calibrations were conducted, and R^2 values were calculated for each compound (the R^2 value is the regression correlation coefficient). In some instances with very low detection limits, a quadratic regression was used to meet the required R^2 value of greater than or equal to 0.99. Therefore, CDFA used a quadratic equation for the non-linear responding compounds.

Each analysis started with a five-point calibration standard. A calibration standard was analyzed after every 10 samples to verify the calibration curve. Throughout a given sample set, a single level calibration standard was intermittently assayed. When calibration failed, the instrument was recalibrated and all samples assayed since the last successful calibration were re-assayed using the newly qualified calibration curves.

When pesticide concentrations were greater than the highest calibration level, the sample was diluted and reanalyzed.

7.2 Matrix Spike Samples

Regional Board staff collected two matrix spike samples that were prepared and analyzed by the CDFA Lab. The matrix was laboratory spiked with diazinon, chlorpyrifos and bifenthrin. The concentrations of the spike compounds added were 5 to 10 times higher than their lower laboratory reporting limits. All compounds were recovered within the CDFA Lab's acceptable limits of 70-130% in both samples.

7.3 Surrogates

During the 2004 monitoring period, chlorpyrifos methyl was added to all environmental and QA/QC samples collected by the Regional Board. Chlorpyrifos methyl was recovered within the acceptable CDFA Lab limits of 50-150% in all samples. Samples at APPL were spiked with tributylphosphate and triphenylphosphate.

7.4 Duplicates

Two duplicate rain samples were collected by Regional Board staff during the 2004 sampling period; one duplicate sample was collected at the Lincoln site and one duplicate sample was collected at the Stockton site. Only the duplicate collected in Stockton on February 3, 2004, had a chlorpyrifos detection of 0.005 µg/L, which is above the PQL, but that duplicate and sample had a 0% relative percent difference.

7.5 Equipment Blanks

Equipment blanks were collected after the rain collectors were cleaned in the field. Two equipment blanks were collected during the 2004 season by Regional Board staff and both samples showed no detectable pesticides. The surrogate for both equipment blanks, chlorpyrifos methyl, was recovered within the CDFA laboratory acceptance criteria range of 50-150 percent.

7.6 Lab Blanks and Lab Spikes

The six lab blanks that were run by the CDFA Lab showed no detectable levels for any of the 17 pesticides that were being tested. Six lab spikes of diazinon, chlorpyrifos, and bifenthrin and the surrogate, chlorpyrifos methyl, were recovered within the lab's acceptance limits of 70-130% for the spike compounds and 50-150% for the surrogate.

Table 1. Rainfall accumulations during the 2004 rain-monitoring period

Duration of Storm Events when Rainfall Samples were Collected	Accumulated Rainfall (inches) at Sacramento Metropolitan /International Airport (Station SMF)	Accumulated Rainfall (inches) at Stockton Fire Station (Station SFS)
1/27-1/29/2004	0.20	0.12
2/2-2/5/2004	0.71	0.88
2/17-2/19/2004	2.09	0.98
2/24-2/26/2004	2.17	1.08
2/29-3/2/2004	0.36	0.20
3/25-3/26/2004	0.20	0.28
4/18-4/19/2004	0.08	No data available

Rainfall data for the Sacramento Metropolitan/International Airport and Stockton Fire Station rain gages was obtained from the California Data Exchange Center (CDEC) database (CDWR, 2004).

Table 2. Rain sampling and sample extraction dates for Regional Board samples analyzed by CDFA Lab

Monitoring Site Name	Sampling Date	Extraction Date
Lincoln Airport (R3)	01/29/2004	02/02/2004
	02/05/2004	02/09/2004
	02/19/2004	02/24/2004
	02/26/2004	02/27/2004
	03/02/2004	03/04/2004
	03/26/2004	04/01/2004
Stockton (R4)	01/28/2004	02/02/2004
	02/03/2004	02/09/2004
	02/18/2004	02/24/2004
	02/26/2004	02/27/2004
	03/02/2004	03/04/2004
	03/26/2004	04/01/2004

Table 3. Rain sampling dates for Sacramento Stormwater Program Permittee samples analyzed by APPL and Caltest Lab

Monitoring Site Name	Sampling Date
Prairie City	02/17/2004
	02/25/2004
	03/01/2004
	03/25/2004
	04/18/2004
Sump 104	02/17/2004
	02/25/2004
	03/01/2004
	03/25/2004
	04/18/2004

Table 4. CDFA Laboratory practical quantitation limits and limits of detection for select pesticides

Compound	Practical Quantitation Limit (PQL in µg/L)	Limit of Detection (LOD in µg/L)
Azinphos methyl	0.050	0.007
Bifenthrin	0.050	0.007
Carbaryl	0.020	0.007
Chlorpyrifos (Dursban)	0.010	0.004
Cyanazine	0.050	0.007
Cyfluthrins	0.200	0.070
I-Cyhalothrin	0.100	0.030
Cypermethrins	0.200	0.070
Dacthal (DCPA)	0.050	0.007
Diazinon	0.020	0.007
Disulfoton	0.020	0.007
Eptam (EPTC)	0.050	0.020
Esfenvalerate	0.050	0.007
Methidathion	0.030	0.010
Metolachlor	0.020	0.007
Propargite	0.500	0.150
Simazine	0.200	0.005

Table 5. 2004 APPL practical quantitation limits for select pesticides

Compound	Practical Quantitation Limit (PQL in µg/L)
Azinphos methyl	1
Bolstar	0.1
Chlorpyrifos	0.01* or 0.05**
Coumaphos	0.2
Def	0.1
Demeton	0.2
Diazinon	0.05
Dichlorvos	0.2
Dimethoate	0.1
Diphenamid	0.1
Disulfoton	0.1
EPN	0.1
EPTC	0.1
Ethion	0.1
Ethoprop	0.1
Ethyl parathion	0.1
Fensulfothion	0.5
Fenthion	0.1
Malathion	0.1
Merphos	0.1
Methidathion	0.1
Methyl parathion	0.1
Methyl trithion	0.2
Mevinphos	0.7
Naled	0.5
Phorate	0.1
Phosalone	0.1
Phosmet	1
Prometon	0.1
Prowl (Pendimethalin)	0.1
Ronnel	0.1
Stirophos	0.1
Sulfotep	0.1
Tokuthion	0.1
Trichloronate	0.1
Trifluralin	0.1

* = For samples collected 02/17/04

** = For samples collected 02/25/04, 03/01/04, 03/25/04, and 04/18/04

Table 6. Caltest Laboratory practical quantitation limits for select pesticides

Compound	Practical Quantitation Limit (PQL in µg/L)
Azinphos methyl	2.5
Chlorpyrifos	0.05
Demeton	0.5
Diazinon	0.05
Disulfoton	1
Ethion	0.5
Ethyl parathion	0.5
Malathion	0.5
Methyl parathion	1

Table 7. Pesticide analytical results for rainwater samples collected in Lincoln, California at the Lincoln Airport

Date of collection	Simazine	Diazinon	Carbaryl	Metolachlor	Chlorpyrifos	Dacthal (DCPA)	% Recovery of Chlorpyrifos methyl (Surrogate)
01/29/2004	0.097 J	0.14	<0.007	<0.007	0.021	<0.007	110
02/05/2004	<0.005	0.020 J	<0.007	<0.007	0.019	<0.007	111
02/19/2004	0.011 J	<0.007	0.007 J	<0.007	0.005 J	0.009 J	101
02/19/2004*	0.033 J	<0.007	0.016 J	<0.007	<0.004	0.010 J	102
02/26/2004	0.009 J	<0.007	<0.007	<0.007	<0.004	<0.007	119
03/02/2004	0.021 J	0.008 J	<0.007	<0.007	<0.004	<0.007	114
03/26/2004	0.045 J	0.015 J	0.033	0.008 J	0.016	<0.007	112

J = estimated (below quantitation limit); * = duplicate
Concentrations in µg/L

Table 8. Pesticide analytical results for rainwater samples collected at 3536 Rainier Ave, Stockton, California

Date of collection	Simazine	Diazinon	Carbaryl	Metolachlor	Chlorpyrifos	Dacthal (DCPA)	Methidathion	% Recovery of Chlorpyrifos methyl (Surrogate)
01/28/2004	0.016 J	0.96	<0.007	<0.007	0.035	0.011 J	0.46	119
02/03/2004	0.061 J	0.37	<0.007	<0.007	0.043	0.008 J	<0.010	116
02/03/2004*	0.070 J	0.37	<0.007	<0.007	0.043	0.008 J	<0.010	113
02/18/2004	0.031 J	0.082	0.018 J	<0.007	0.022	0.023 J	<0.010	115
02/24/2004	0.048 J	0.062	<0.007	<0.007	<0.004	0.011 J	<0.010	121
03/02/2004	0.042 J	0.047	<0.007	<0.007	0.012	0.009 J	<0.010	97
03/26/2004	0.10 J	<0.007	<0.007	0.072	0.031	0.028 J	<0.010	139

J = estimated (below quantitation limit); * = duplicate
Concentrations in µg/L.

Table 9. Pesticide analytical results for rainwater samples collected at Prairie City OHV Park in Rancho Cordova, California

Date of Collection	Diazinon	Chlorpyrifos	Methidathion	Pendimethalin	Azinphos methyl
02/17/2004	<0.05	<0.01	<0.1	<0.1	<1
02/25/2004	<0.05	<0.05	<0.1	<0.1	<1
03/01/2004	<0.05	<0.05	NA	<0.1	<1
03/25/2004	<0.05	<0.05	NA	NA	<2.5
04/18/2004	<0.05	<0.05	NA	NA	0.72 J

NA = not analyzed; J = estimated (below quantitation limit)

Table 10. Pesticide analytical results for rainwater samples collected at Sump 104 in Sacramento, California

Date of Collection	Diazinon	Chlorpyrifos	Methidathion	Pendimethalin	Azinphos methyl
02/17/2004	0.03 J	<0.01	<0.1	0.06 J	<1
02/25/2004	<0.05	<0.05	<0.1	0.07 J	<1
03/01/2004	0.04 J	<0.05	NA	<0.1	<1
03/25/2004	<0.05	<0.05	NA	NA	<2.5
04/18/2004	<0.05	<0.05	NA	NA	<2.5

NA = not analyzed; J = estimated (below quantitation limit)

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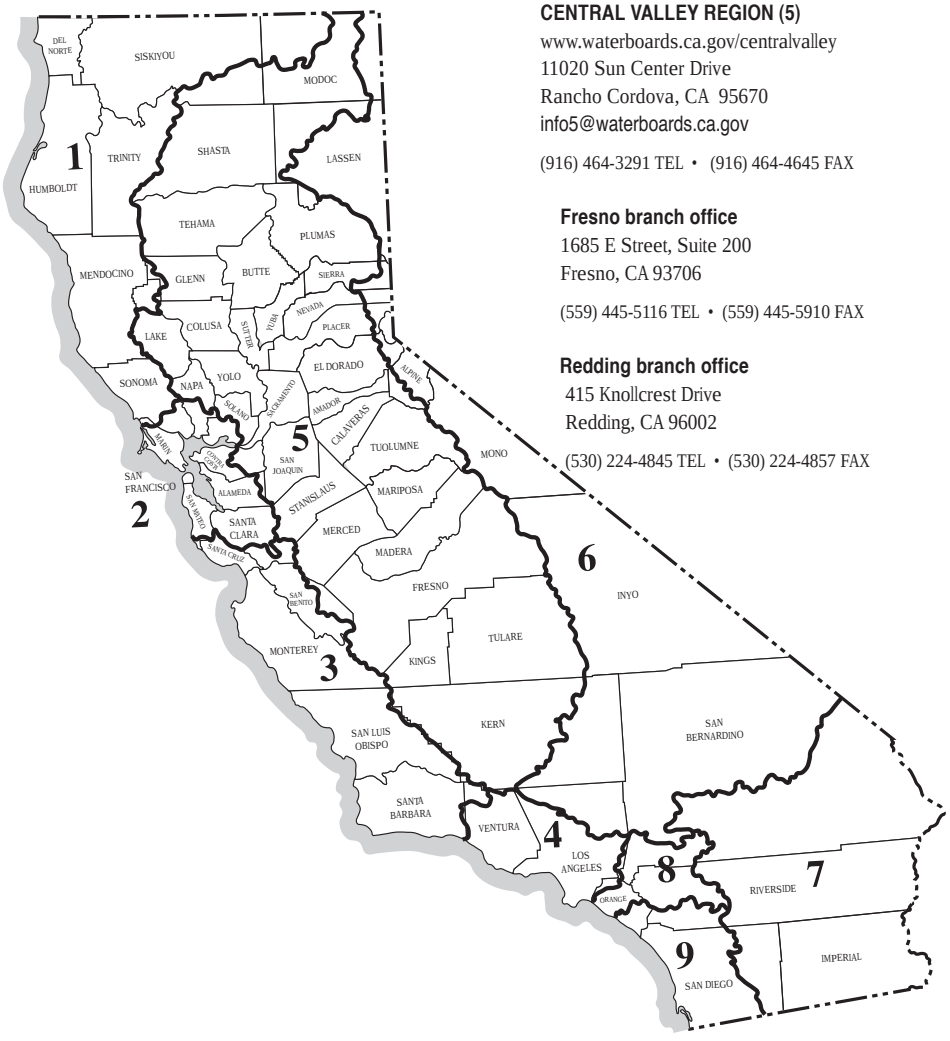

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